**Review Questions Celestial Sphere Defined**

1. How does the sky *appear* to move around us?

**East to West**

1. What motion of the Earth produces the *apparent* motion of the stars around us?

**Rotation**

**Review Questions Angles**

1. How many degrees is 30 arc minutes?

**.5°**

1. How many degrees is 10 arc seconds?

**([1/60]/60) = .00028° OR (1/3600)10 = .00028° OR 1/3590 = .00028°**

1. How many Moon diameters would it take to span the distance from a point on the eastern horizon to a point directly opposite on the western horizon?

**360**

**Review Questions Reference Markers**

1. How do the positions of the celestial equator, celestial poles, zenith, and meridian depend on the latitude of the observer?

**CE is higher in sky as you approach TE crossing through your Z when you are at the TE; CP’s get higher in sky with increasing distance from TE; Z always is point above your head straight up; CM always is imaginary line dividing sky into east and west**

1. Would their position with respect to the horizon change if the Earth were only 200 miles in diameter? How about 80,000 miles in diameter? Why is that?

**NO, still a globe, same orientation**

1. During a night, how do the stars move? What angle does their nightly path make with respect to the horizon? How does it depend on latitude?

**Stars move E to W, from this lat. up and to the right then down and to the right setting; star paths are parallel to the CE, perpendicular to axis meaning that as observer’s latitude changes so will the angle of the path with respect to the horizon: smaller angles near the poles, larger angles up to 90° at the equator.**

1. What reference point is a celestial object on when it is at its highest position above the horizon?

**Meridian**

1. Why do observers in the northern hemisphere see celestial objects above the celestial equator for more than 12 hours?

**These are circumpolar objects that never set (go below horizon)**

1. For northern hemisphere observers, which celestial object would be above the horizon for the greatest amount of time: one that is on the celestial equator, one that is 30° above the celestial equator, one that is 70° above the celestial equator, or one that is 40° below the celestial equator? Which one would be above the horizon the greatest amount of time for southern hemisphere observers? Explain your answer.

**70° above the CE because this object would probably be circumpolar (depending on observer’s lat.); 40° below CE – out of the options the object located at this position would reach the highest altitude in the sky for an observer giving it the most time in the sky**

**Review Questions Motion of Our Star the Sun**

1. How does the Sun move with respect to the stars during the year?

**Eastward**

1. Why does everyone have 12 hours of daylight on the equinoxes?

**Sun rises directly in the East and sets in the West, Sun follow exactly on CE**

1. Why is the length of daylight in the northern hemisphere so short on December 21?

**Earth is tilted away from Sun, Sun doesn’t get very high in the sky**

1. When will the Sun be at its highest altitude in the year in Los Angeles or Seattle? How about Singapore (on the Equator)? Why?

**Summer Solstice for LA and Seattle (June 21st); Singapore the Sun will be highest at either equinox b/c the Sun will pass through the Z on those days.**

1. On what date is the Sun above the horizon the shortest amount of time for the *Southern* Hemisphere? Why?

**June 21st; Southern Hemisphere is tilted away from Sun at that time**

**Review Questions**

1. At what two azimuths does the celestial equator intercept the horizon? **90° and 270°**
2. If a star's position at 10 pm is 110° azimuth and 40° altitude, will its azimuth be greater or less at 11 pm? If the star is still east of the meridian at 11 pm, will its altitude be greater or less than it was at 10 pm? First assume you are in the northern hemisphere. Explain your answer. Then assume you are in the southern hemisphere and explain your answer. **Greater azimuth and altitude at 11pm than 10pm; in SH altitude increases but azimuth will decrease after one hour**
3. Why do astronomers prefer using right ascension and declination? **This system is fixed with respect to the stars so, unlike the altitude-azimuth system, a star's position does not depend on the observer's location or time. Because of this, astronomers prefer using this system.**
4. What is the azimuth of *any object* when it crosses the meridian at *any time of year* in the southern sky? **180°**
5. If a star has a RA of 5 hours and crosses the meridian at 10:45 pm, what is the RA of a star that crosses the meridian at 1:00 am? Explain your answer. **2 hours 15min behind first star, so RA of 7hours 15min**
6. What is the Sun's altitude when it crosses the meridian in Bakersfield and its declination is +23.5°? **78.5°**
7. What is the altitude of the NCP at Fairbanks, Alaska (lat. = 65° N)? **65**
8. How do the positions of the equinoxes and solstices with respect to the horizon depend on the latitude? **Positions do not change for equinoxes; the further you are away from the CE, the more extreme (farther away from E and W the positions of the solstices.**
9. What is the maximum altitude of the Sun on the vernal equinox for people on the equator? What is the Sun's azimuth and right ascension at that time? **90°, 90 or 0, 0hrs**
10. What will the Sun's declination be on the following dates: June 21, March 21, September 22, and December 21? **23.5, 0, 0, -23.5**
11. What will the Sun's approximate declination be on the following dates: April 10, July 20, and October 31? Explain your answer. **Around 8, around 20, -14.5**
12. If the Sun sets 10° away from due West on October 20, what is the sunset azimuth? **260°**
13. If the Sun rises 12° away from due East on April 19, what is the sunrise azimuth? **78°**
14. What causes precession? **Earth is non-spherical (bulges at equator) and gravity from Sun and Moon**
15. How does precession affect the positions of the stars? **Earth points to different locations in space making the stars RA and D change over a period of 26,000 years.**
16. If a star on the celestial equator has a RA of 5 hours 33 minutes, what would you estimate its RA to be in 20 years and in 200 years? Explain your answer. (Remember that the Earth spins about 15°/hour.) **5hrs 34 min after 20 years, 5hrs, 43 min after 200 years.**
17. Which star is the current pole star? Which star was the pole star 2,000 years ago? Which star will be the pole star 8,000 years from now? **Polaris, Kochab, Deneb respectively**
18. Are modern horoscopes based on the current motion of the Sun and planets with respect to stars? **NO, on a system that is 4000 years old!**